Space Weather Forecast

Issued on Wednesday, 02 August 2023 at 01:14 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts expected Day 1, with a chance of R3 (Strong flares). R1-R2 Blackouts likely Days 2-4. Coronal Mass Ejection effects anticipated Days 3-4 (04-05 Aug) with G1/Minor Storm possible.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate solar activity with occasional Moderate flares, peaking at 01/0657 UTC from the largest and most complex region, located on the southwest of the visible disc.
There are currently eleven sunspot regions on the disc, with the region in the southwest the most notable. There are two further moderately sized regions which have shown some signs of growth, but these remain fairly simple at this stage. All other regions are small and simple at the present time. Despite this, two regions in the east of the disc have both been the source of a number of minor flares over the past 24 hours.

No Earth-directed Coronal Mass Ejections (CMEs) were observed leaving the Sun on available imagery over the past 24 hours. However, two eruptions late on 31 Jul (and observed on imagery early 01 Aug) are considered to have Earth-directed components.

Solar Wind / Geomagnetic Activity: The solar wind was at mostly ambient levels, before a CME arrival started after 01/1100 UTC. Wind speeds varied between 350-430 km/s. The total interplanetary magnetic field strength was initially weak, but jumped to moderate after 01/1100 UTC where it has since remained. The north-south component was also weak but switched from southward to northward directed around 01/0200-1200 UTC, and has weakly fluctuated since then. Geomagnetic activity was Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was still just slightly above background levels after the recent enhancement from the far-side event on the 28 Jul, but fell to background levels around 01/0615 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is expected to be Moderate, with a chance of rising to High Day 1 (02 Aug) and a slight chance Days 2-4 (03-05 Aug). This is mainly due to the potential for Moderate flares, along with a chance of Strong flares, from the complex region on the southwest disc. Other regions contribute to the flare risk, including the anticipated return of a notable sunspot region Days 1-2.

Solar Wind / Geomagnetic Activity: An Earth-directed CME has recently arrived. Two further CMEs emerged from the Sun last night, both of which may are thought to have an Earth-directed component. Glancing blows are considered possible Day 3 (04 Aug) or less likely Day 4 (05 Aug). Solar winds largely remaining at slow-ambient levels, perhaps increasing 400-500km/s late Day 3 or more likely Day 4 due enhancement from two coronal hole fast winds either late Day 3 or more likely Day 4 (03-04 Aug), and may coincide with potential CME glancing influence.

Geomagnetic activity is expected to be largely Quiet to Unsettled (Kp0-3), with a chance initially of Active (Kp4) intervals and a slight, but diminishing, chance of a G1/Minor Storm (Kp5). There

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is a further chance of Active to G1/Minor Storm intervals late Day 3 into Day 4 with forecast coronal hole and CME influence.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to remain at background levels. There is a slight chance of further enhancements from any larger flares that occur, mainly from the complex region in the southwest.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	15	5	30	15
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	70	70	60
Very Active	R3 to R5 X	No	20	15	15	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	20	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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